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ABSTRACT

Recent research studies and texts in composition demonstrate the growing belief that students' difficulties with the writing tasks assigned to them are inextricably linked with their difficulties in handling complex cognitive processes. Through appropriate writing activities, students can be provided with practice in the intellectual functions that will foster cognitive development during the critical periods of the maturation process. For this to take place, the theoretical models of cognitive development need to be translated into pedagogical categories useful for identifying the levels at which students are operating at particular times. Two such category systems have been proposed--the Crediton Model by A. Wilkinson and others, and another by J. A. Deuser that focuses on synthesis. J. Piaget's concrete-operational stage is translated by Wilkinson into describing and interpreting categories, while Deuser's model shows no synthesis. The formal-operational stage is translated by Wilkinson into the generalizing category and by Deuser into three levels of synthesis. The Wilkinson model further translates Piaget's category for formulating questions into speculating. These categories allow for the pursuit of additional research on the relationship between the model of development that a paper takes to achieve its function and the level of cognitive development demonstrated in that paper. (HOD)

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Fostering Cognitive Growth Through Writing

Recent research studies and texts in composition demonstrate the growing belief that our students' difficulties with the writing tasks assigned to them are inextricably linked with their difficulties in handling complex cognitive processes (Lunsford, 1979, 1980; McQuade and Atwan, 1980; Sternglass, 1981, in press). Assumptions about our students' reading abilities, writing abilities and thinking abilities have changed markedly over the past ten years. We hear research cited that maintains that over 50% of students entering college have not achieved the level of "formal operations" (McKinnon, 1976). What does that mean and why is it important?

Jean Piaget has postulated four distinguishable stages through which individuals pass as they develop from infancy to maturity: sensory-motor, pre-operational, concrete operational and formal operational. Each of these stages, according to Piaget, arises out of the preceding one and builds upon it not only larger, but more complex structures. "From this point of view, mental development is a continuous construction comparable to the erection of a vast building that becomes more solid with each addition" (Piaget, 1967:4). In his introduction to a collection of Jerome Bruner's essays, Beyond the Information Given (1973), Jeremy Anglin points out that for both Piaget and Bruner, cognitive development involves qualitative rather than quantitative changes in the cognitive structures that mediate behavior at different ages.

Distinguishing between Piaget's concrete-operational stage and formal operational stage is crucial to an understanding of why this issue of

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the cognitive level of incoming freshman students is raised so frequently. For the child who has reached the age of six or seven, on Piaget's model, thought relates only to concrete existing objects and people. The intellectual structures guiding reasoning activities are confined to four operations: combining groups into an inclusive group (boys and girls are children); associating, i.e. recognizing that the sum of a series is independent of its order (two rows of three buttons or three rows of two buttons make a total of six buttons); understanding the concept of identity, i.e. that one of the elements of a group may be such that combining it with any other element leaves that element unchanged (in addition the identity element is 0; in multiplication 1 is the identity element); and recognizing reversibility, i.e. that each element in a set has an opposite which, combined with it, reverses the operation to its starting point (2 + 2 = 4 so 4 - 2 = 2; if A is less than B, B must be greater than A) (Pulaski, 1971: 54-55). Each of these reasoning operations, which characterize Piaget's concrete operational stage, is rooted in physical pheonomena.

But, as Vygotsky (1934, reprinted 1962) points out, the existence of these concrete types of associations, however numerous and strong, between verbal symbols and objects is not in itself sufficient for concept formation. In other words, an individual must be able to go beyond what is immediately present in the physical environment, must transform that experience into symbolic form, and relate it to a system which he/she has previously developed to deal with the non-present (Bruner, 1964). Only during adolescence will the realm of hypothetical throught, dealing with theories and propositions, be attainable (Pulaski, 54).

Inhelder and Piaget (1964) have called this type of reasoning "second order operations." While the child of seven to eleven, understanding the relationships of classes within classes and putting objects and events in serial order (called "describer thinking"), can deal with concrete facts in a real and visible world, the adolescent is capable of inferential thinking. By this Piaget means thinking about thoughts rather than about things that exist (Pulaski, 67). Anglin, describing Bruner's model, says that this phenomenon is the first step in a recursive process required to solve a problem where there is an inferential leap from sense data to a tentative hypothesis achieved by relating incoming information to an internally stored model of the world based upon past experience. (The inferential leap described by both Piaget and Bruner accounts for their belief that cognitive development involves the qualitative changes in the cognitive structures mentioned earlier. Only when adult inferential thinking has been achieved can the individual be said to be operating on the "formal" level.) Vygotsky has emphasized that a concept (Piaget's "second-order operation" or "formal operation") can emerge only in the course of a complex operation aimed at the solution of some problems.

In their own ways, each of the three cognitive psychologists whose work has been cited thus far, Vygotsky, Piaget and Bruner, has emphasized the importance of past experience upon the maturation of cognitive structures. In order to create Bruner's "internally stored model of the world," the individual must have the opportunity to engage in the physical and empirical experiences (which Piaget calls "sensory-motor") from which the more abstract mental operations can arise (Pulaski, 10-11). Vygotsky suggests that the presence of a problem that demands the formation of concepts cannot itself be the cause of the process, but if an environment

presents no such tasks to the adolescent, makes no demands on him/her, and does not stimulate the intellect by providing a sequence of new goals, the individual's thinking fails to reach the highest stages, or reaches them with great delay (Vygotsky, 58-59). Greenfield and Bruner (1969) observe that the intellectual maturing that makes it possible eventually to use language as a tool of thought requires long years of complex training. They maintain that if intellectual training is not freely engaged in in its pragmatic function of guiding thought and action, then one finds forms of intellectual functioning that are adequate for concrete tasks, but not so for matters involving abstract conception.

Piaget's thesis is that there are critical periods during the maturation process. He believes that there are certain aspects of development that must receive practice at the time the organism is ready to perform them or that particular organism will not develop (Pulaski, 32-33). Thus the notion that maturation and experience come together at critical junctions explains why an understanding of cognitive processes and cognitive levels is crucial to educators.

Once thought has been separated from its objects, the stage is set for symbolic processes to run ahead of concrete fact. At this point, the way is open for Piaget's stage of formal operations (Greenfield and Bruner, 1973). Through appropriate writing activities, students can be provided with practice in the intellectual functions that will foster cognitive development during the critical periods of the maturation process.

The theoretical models of cognitive development need to be translated into categories useful for identifying the levels at which students are operating at particular times. Two such category systems have been proposed, the Crediton Model by Andrew Wilkinson and his colleagues at

the University of Essex (Wilkinson et al, 1979) and another by Jeffrey Deuser at Indiana University (Deuser, 1981). Table 1 indicates how Piaget's theoretical model can be formalized into operational categories.

[Table 1]

Through the categories of Wilkinson and Deuser, we are able to assign student writing to the appropriate cognitive levels. These categories allow us to pursue an additional research area of interest, the relationship between mode of development that a paper takes to achieve its function and the level of cognitive development demonstrated within that paper. For example, should we expect that a task which seems to assume exposition as the dominant mode of development will be more likely to generate a "higher" cognitive level than a task which suggests narration as the dominant mode? Does a task developed, for example, in the expository mode guarantee that a minimal level of synthesis will be achieved? Do tasks in one or more of the traditional modes not contribute to cognitive growth on a developmental scale?

I have recently begun a study of student papers on a range of tasks over a semester's time and would like to report now on some preliminary findings in the analysis of the first task. The task itself was for students to identify some possible ideas or points of views that two narrative essays shared. The readings themselves were the same two essays that I reported on in a recent article in College English, (1981) but the instructional process accompanying these readings was completely redesigned. Students participated in pre-reading activities that focused their attention on the essays, formulated predictions in writing about what they would find, spent class time discussing and analyzing the essays both orally and in writing, and were then directed to the writing task.

Table 1

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Translating Piaget's Theoretical Model of Cognitive Development into Pedagogical Categories

Piaget's Stages of Cognitive Development	Crediton Model Categories (Wilkinson et al)	Deuser Model Categories
Concrete-operational. Describer thinking. Dealing with the logic of classes and relations, concrete facts in a real and visible world.	Describing. There is a move from labelling and naming, via simple statements and incomplete information, to reporting of a complete sequence.	No synthesis
	Interpreting. The development is from a simple explanation or inference or assessment to a deduction drawing on a series of (e.g. causal) links.	
Formal-operational. Thinking about thoughts rather than things that exist. An inferential leap from sense data to a tentative hypothesis achieved by relating incoming information to an internally stored model of the world based upon past experience.	Generalising. The baseline would be a generalised concrete statement, moving to a summation of a whole section, and thence to the generalisations implied by a classificatory system.	First level of synthesis. Seeing that a relationship exists. Second level of synthesis. Seeing significance in the relationship. A statement explaining the importance of the synthesis to the two things compared. Third level of synthesis. Generalization based on synthesis but applied to other things of a similar nature, or used to characterize an ongoing process or feature.
[An additional stage to Piaget's model, the stage of formulating questions, has recently been proposed.]	Speculating. The movement here is from inadequate simple hypothesis at the statement level, via exploring and project[ing] at the discourse level, to controlled and extended theorising.	

Since the task asked them to identify possible ideas or points of view that the essays shared, it can be seen that the students were being expected to operate on Wilkinson's level of generalizing or Deuser's first level of synthesis. They were not specifically asked to provide a statement of the significance of the relationship.

A preliminary analysis of 48 student responses to the task is outlined on Table 2.

[Table 2]

All 48 students responded in the expository mode. Table 2 reflects both the disappointments and the possibilities of trying to foster cognitive development within a composition class. The disappointment is reflected in the statistics: 75% in Wilkinson's Describing Category, 15% in the Interpreting category and only 10% in the Generalizing category. But even within the small sample of papers presently analyzed, only 48, all three levels of synthesis posited by Deuser are present. This small sample also illustrates that it is possible to characterize student writing on a cognitive level basis.

This analysis suggests that a task developed in the expository mode does not guarantee that a minimal level of synthesis will be achieved. In addition to creating a task with a purpose that calls for expository development, instructors must provide examples of true levels of synthesis and repeated opportunities for practice in achieving synthesis. I hope that as I continue the analysis of the approximately 1700 student papers that I have, written covering five different tasks, that I will find further insights into how to accomplish this.

Table 2

Responses to Task 1: "Identify possible ideas or points of view that the essays share."

Crediton Model (Wilkinson)	Student Examples	Deuser Model
escribing 36 (75%)	"In the essay, there is evidence that the authors often want to return to their childhood cultures."	No synthesis
nterpreting 7 (15%)	[Rodriguez] was unable to go totally back to the Chicano culture and unable to go totally to the American culture. He could enjoy neither the happiness of one nor the other, but was caught in the dim reality between them both."	
eneralizing 5 (10%)	"Achieving their goal of success created conflicts between their past culture and their present one."	First level of synthesis
	"Many people have had many emotional problems trying to grow up away from home. This is a part of growing up and accepting more responsibility each day, like Liv and Richard have been experiencing. It has never been easy growing up and probably never will."	Second level of synthesis
	"The deprivation of one's own society is probably one of many pejorative effects that America has put upon people. Many times it is not America's fault. The immigrants know that to live in America, he [sic] must adopt American ways and lose some of his own culture. If one is a traditionalist and very strict on customs of the culture, America might not be the best place."	Third level of synthesis
peculating 0 (0%) N = 43		

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